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BOTANY.

Campbell's Evolution of Plants.[1] — In publishing his lectures on the evolution of plants, delivered at Stanford University, Dr. Campbell has done a good service not only to students of botany but also to a wide circle of readers interested in general biological problems. The book will prove enjoyable reading to persons with no more knowledge of the technicalities of botany than many high schools now afford. Teachers have long desired such a book for use with advanced pupils. At the same time it will be welcome to botanists as a broad, clear statement of the main facts of plant development and their interpretation from the most modern point of view.

After an introductory chapter, followed by one on "The Conditions of Plant Life," the author discusses in nine chapters the morphology, ontogeny, and phylogeny of the principal types of the vegetable kingdom, and finally, in three chapters, gives a rapid survey of "Geological and Geographical Distribution," the interrelations of "Animals and Plants," and the "Influence of Environment." Each chapter and the book as a whole concludes with a helpful "Summary."

The truly scientific spirit of these lectures cannot fail to exert a wholesome influence upon the students who read them. We find throughout the clearest distinction made between what is actually known and what may be more or less probable, and in weighing probabilities rival views are treated with perfect fairness. Due caution and entire frankness are most happily combined with ample freedom of the "scientific imagination."

One always feels entire confidence that Dr. Campbell's statements are not only trustworthy but up to date. In this case the impression is of a wide range of facts and ideas presented as nearly as possible in their true perspective.

FREDERICK LEROY SARGENT.

A Recent Work on Bryophytes.[2] — The first part of the second volume of Goebel's important work on the organography of plants is now before us and well maintains the high standard set by the first volume, which has already been reviewed in the *Naturalist.* The second part is concerned with special organography, and the part just published deals exclusively with the Musciniæ. Goebel's extensive studies on these plants make this a most important contribution to our knowledge of the bryophytes.

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[1] Campbell, D. H. *Lectures on the Evolution of Plants.* 12mo, viii + 319 pp., 60 figs. New York, The Macmillan Company, 1899.

[2] Goebel, K. *Organographie der Pflanzen,* Zweiter Theil, Heft 1. Jena, 1898.

The structure and development of the different organs are fully treated, but especial attention is devoted to the many adaptations to their environment exhibited by the mosses and liverworts. No botanist has done more to increase our knowledge in this direction, and the present work includes much extremely valuable and interesting matter, a good deal of which is now published for the first time.

The development of the archegonium and antheridium is first discussed, and the various devices for protecting these and the significance of their peculiar position in certain forms are treated at length. The dehiscence of the antheridium is fully described — more so than we can recall elsewhere. The most notable point in connection with the archegonium is the confirmation of the views of Janazewski and Kühn in regard to the apical growth in the archegonium of the Musci, which had been disputed by Gayet.

The various modifications of the Gametophyte in the lower Hepaticæ are described at length, and some very interesting figures are shown, especially those relating to certain tropical types like Symphyogyna and some of its allies.

The different types of gemmæ and tubers found among the liverworts are fully treated. Genuine tubers, which formerly were supposed to be absent from the Hepaticæ, are now known in several genera, including species of Anthoceros, Geothallus, and Fossombronia. The recent discovery of these in a number of liverworts from California and South America indicates that these structures probably occur in a good many species of dry regions. Descriptions and numerous figures of the contrivances for storing water, such as the sac-like organs in the leaves of many tropical Jungermanniaceæ, are given. As might be expected from the careful study of these which the author has made before, the subject is given very thorough treatment.

The various types of sporophyte found among the Hepaticæ are described and figured, but this section of the work does not include much that is new.

As might be expected, the Musci are given less space than the much more generalized and varied Hepaticæ. The more aberrant types, like Schistostega, Sphagnum, and Buxbaumia, are considered somewhat at length. The latter Goebel is still inclined to consider as a primitive type, although many botanists will be inclined to consider it as a degenerate rather than as a primitive form.

Of the different types of sporogonium among the Musci the peculiar genus Nanomitrium is interesting as showing very marked similarity in the arrangement of its parts to that of the typical liverworts. In this moss most of the endothecium appears to be composed of sporogenous tissue. Whether this genus, and the similar Archidium, are really primitive types, as Leitget supposed, or are related to the typical Bryineæ, remains to be seen.

The book is fully illustrated and includes many new figures. It is certainly a most important contribution to the literature of the archegoniate plants.

D. H. C.

Aldehyde in Leaves.[1] — The formation of an insoluble "hydrazone" on the addition of metanitrobenzohydrazide to a solution of an aldehyde was taken as a means of the quantitative estimation of the latter substance in green leaves. Previously it has been shown by qualitative tests that a "leaf aldehyde" (Blätteraldehyd) is found in many plants. The quantity present seems to vary within wide limits; the conditions influencing its formation are not understood. From the experiments it appears that leaves kept in continued darkness show a decrease in the amount of aldehyde present, but by no means all of it disappears under such conditions. The bearing of this fact on the suggestions that some form of aldehyde is the first product of photosynthesis are, however, not distinct at present. But while nothing has been shown which proves that such a substance may be the initial carbohydrate formed, it is a matter of interest that the aldehyde can be utilized by the plant as a food substance, and such certainly seems to be the case. It would be of especial value, however, to know something of the relation which exists between the disappearance of starch in the absence of light and the partial use of the aldehyde under similar conditions. One might then be able to conclude whether it is due to the exhaustion of other reserve material that the plant is perforce necessitated to utilize the aldehyde, or whether it exercises any selective power in this regard. The writers do not maintain that the aldehyde is to be regarded as the first assimilation product, — in fact they directly state that it is to be regarded as a by-product; but it is hard to agree with them that had

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[1] Reinke, J., and Braunmüller, E. Untersuchungen über den Einfluss des Lichtes auf den Gehalt der grünen Blätter an Aldehyd, *Rev. d. deut. Bot. Gesel.*, Bd. xvii, Heft 1, p. 7.